

Claims

1. A reforming catalyst for use in feed streams containing steam, CO₂, and CO at levels such that the H₂O/CH₄ is less than 0.8 and the CO₂/CH₄ is greater than 0.5, the feed stream further containing relatively high quantities of sulfur compounds, the catalyst comprising from about 0.5
5 wt% to about 25 wt% of a calcium compound additive, from about 2 wt% to about 30 wt% nickel, from about 25 wt% to about 98 wt% of an aluminum compound carrier, and from about 0.01 wt% to about 20 wt% of titanium.
2. The catalyst of Claim 1 wherein the calcium compound combined with the aluminum compound comprises calcium aluminate.
- 10 3. The catalyst of Claim 1 wherein the amount of free calcium oxide present in the catalyst is not detectable by x-ray diffraction.
4. The catalyst of Claim 1 wherein the calcium compound comprises from about 2 wt% to about 16 wt% of the catalyst.
5. The catalyst of Claim 1 wherein the nickel comprises from about 2 wt% to about 20 wt%
15 of the catalyst.
6. The catalyst of Claim 1 with a BET surface area greater than about 4 m²/g.
7. The catalyst of Claim 1 with a BET surface area from about 6 m²/g to about 30 m²/g.
8. The catalyst of Claim 1 with a nickel specific surface area greater than about 2 m²/g.
9. The catalyst of Claim 1 with a nickel specific surface area greater than about 4 m²/g.
- 20 10. The catalyst of Claim 1 with a pore volume greater than about 0.2 cc/g.

11. The catalyst of Claim 1 wherein the stabilizer comprises from about 0.1 wt% to about 10 wt% of the catalyst.

12. A reforming catalyst comprising from about 0.5 wt% to about 25 wt% of a calcium compound additive, from about 2 wt% to about 30 wt% nickel, from about 25 wt% to about 98 wt%
5 of an aluminum compound carrier, and from about 0.01 wt% to about 20 wt% of titanium, wherein substantially all of the calcium is combined with the alumina and wherein said catalyst has a BET surface area greater than about 4 m²/g.

13. The catalyst of Claim 12 wherein the calcium compound comprises from about 2 wt% to about 16 wt% of the catalyst.

10 14. The catalyst of Claim 12 wherein the nickel comprises from about 2 wt% to about 20 wt% of the catalyst.

15. The catalyst of Claim 12 wherein the titanium comprises from about 0.1 wt% to about 10 wt% of the catalyst.

16. The catalyst of Claim 12 with a BET surface area from about 6 m²/g to about 30 m²/g.

15 17. The catalyst of Claim 12 with a nickel specific surface area greater than about 2 m²/g.

18. The catalyst of Claim 12 with a pore volume greater than about 0.2 cc/g.

19. A process for formation of a stabilized calcium-promoted nickel aluminate catalyst comprising blending an aluminum compound carrier with a calcium compound promoter and a titanium compound, forming the blended material into a desirable shape, treating and calcining the
20 shaped material to form a catalyst precursor, impregnating the catalyst precursor with a nickel compound and calcining the impregnated material to form the catalyst.

20. The process of Claim 19 wherein said titanium compound is selected from the group consisting of titanium, titanium oxide, titanium hydroxide, titanium metal, any organic form of titanium and combinations thereof.